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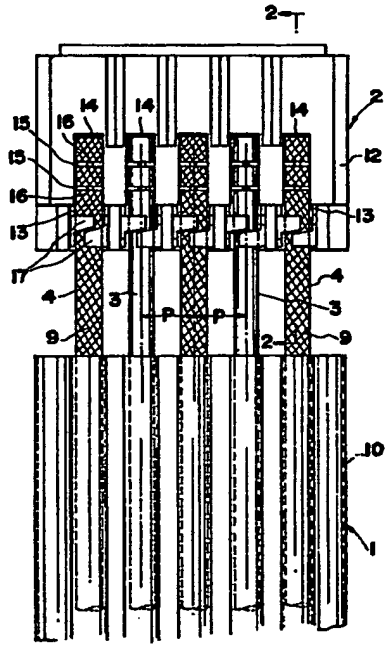
(54) Electrical harness.

(57) An electrical harness includes a shielded cable (1) connected to contact-type connectors (2) at each end, the shielded cable (1) including insulation clad signal transmission wires (3) and at least one carbon clad earth wire (4) covered with a metal covering (9), wherein the signal transmission wires (3) and the carbon clad earth wire (4) are spaced apart and are wrapped in an electrically conducting sheet (10) covered with an outer insulation layer and each connector (2) includes terminals (13) with contacts (15) and retainers (17), each of the terminals (13) having a slot tightly to receive one of the signal transmission wires (3) or one of the earth wires (4) such that in the signal transmission wires (3) the retainers (17) engage the insulation cladding (6) and in the earth wires (4) the retainers (17) engage the metal mesh (9) and the contacts (15) of the terminals (13) receiving the earth wires (4) make electrical connection between the wires (4) and the metal covering (9) and thus with the conducting sheet (10).

FIG. 1



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ELECTRICAL HARNESS

The invention relates to an electrical harness including a shielded cable connected to contact-type connectors, for use in transmitting high-frequency signals.

It has been previously proposed to employ a shielded cable provided with contact-type connectors and including insulation clad signal transmission wires and carbon clad earth wires arranged mutually in parallel and at equal intervals. The shielded cable can be completely wrapped in an electrically conducting foil and covered with an outermost insulating layer.

However, one disadvantage of previously proposed shielded cables is that the resulting shield effect is reduced, particularly in the high-frequency zones, because of the relatively high electrical resistance between the earth wires and the foil, which derives from the fact that the intermediate carbon layer has a higher electrical resistivity than the metal foil.

According to the invention, there is provided an electrical harness comprising a shielded cable with a respective connector at each end, the shielded cable comprising a plurality of insulation clad signal transmission wires and a carbon clad earth wire with a metal covering, wherein the signal transmission wires and the earth wire are spaced apart and are wrapped in an electrically conducting sheet covered with an outer insulation layer; each connector comprises a housing mounting terminals having contacts and retainers; each terminal has a recess tightly to receive one of the signal transmission wires or the earth wire with the terminals receiving the earth wire effecting electrical connection between the earth wire and the metal covering which is in electrical connection with the conducting sheet; and the retainers engage the insulation of the signal transmission wires or the metal covering of the earth wire.

In such a harness the shielded cable can exhibit an enhanced shield effect even in the high-frequency zones.

Preferably the metal covering is covered with a metal foil.

Advantageously the harness includes a plurality of earth wires with the earth wires arranged alternately with the signal transmission wires.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:-

Figure 1 is a front view showing one end of an electrical harness including a shielded cable and connectors according to the invention;

Figure 2 is a sectional view taken on line 2-2 in Figure 1;

Figure 3 is a cross-section showing a part of the shielded cable on an enlarged scale;

Figure 4 is a fragmentary sectional view showing the assembly of the shielded cable and the connectors; and

Figure 5 is a perspective view showing a contact of one of the connectors.

An electrical harness comprises an assembly of a shielded cable 1 with a respective connector 2 at each end.

As best shown in Figure 3, the shielded cable 1 includes a plurality of signal transmission wires 3, and at least one earth wire 4 (the illustrated embodiment uses a plurality of earth wires). Each signal transmission wire 3 comprises a conductor 5 covered with an insulation 6 of plastics such as vinyl chloride, polyethylene, crosslinked polyethylene or foam polyethylene, and the or each earth wire 4 contains a conductive core 7 covered with a carbon fibre 8, which is covered with a metal covering 9 in the form of a mesh or a winding. Preferably the metal covering 9 is covered with an aluminium or a copper foil so as to prevent the metal covering 9 from being exposed. When a plurality of earth wires 4 are used, it is preferred as shown in Figure 1 for the signal transmission wires 3 and the earth wires 4 to be alternately arranged at equal pitch P, where P measured axis-to-axis is preferably 2.5mm. The shielded cable is wholly wrapped in an electrically conducting sheet 10 such as copper or aluminium foil, which is covered with an outermost insulating layer 11.

Each connector 2 has a housing 12 made of an insulating material such as nylon, which houses terminals 13 press formed of electrically conducting material such as phosphor bronze. The housing 12 includes a plurality of seats 14 for accommodating the individual terminals 13 with the pitch of adjacent terminals 13 equal to the pitch P.

Each terminal 13 includes a U-shaped recess and a retainer in the form of bendable arms or ears 17. The U-shaped recess can tightly receive one of the signal wires 3 or one of the earth wires 4. Each terminal 13 also includes a sleeve 18 which can receive a terminal post 21 projecting from a printed circuit board 23 and through an insulating base 22 as shown in Figure 2.

The signal transmission wires 3 and the earth wires 4 of the shielded cable 1 are electrically connected to the respective terminals 13 by contacts 15 and the arms 17 are bent to retain the signal transmission wires 3 or the earth wires 4 with the bent arms 17 engaging the outermost insulating layer 11 of the signal transmission wires 3 or the metal mesh 9 of the earth wires 4. In this

way the shielded cable 1 and the connectors 2 are assembled into an electrical harness, with the earth cores 7 being in electrical contact with the electrically conducting sheet 10 by way of the contacts 15 of the terminals 13 and the metal covering 9, thereby effecting metal-to-metal electrical connection. Thus the shielding effect of the earth wires 4 is enhanced even in the high-frequency zones.

As mentioned above, it is not necessary to use a plurality of earth wires 4 but at least one earth wire 4 suffices disposed amid the signal transmission wires 3.

Claims

1. An electrical harness comprising a shielded cable (1) with a respective connector (2) at each end, the shielded cable (1) comprising a plurality of insulation clad signal transmission wires (3) and a carbon clad earth wire (4) with a metal covering (9), wherein the signal transmission wires (3) and the earth wire (4) are spaced apart and are wrapped in an electrically conducting sheet (10) covered with an outer insulation layer (11); each connector (2) comprises a housing (12) mounting terminals (13) having contacts (15) and retainers (17); each terminal (13) has a recess (16) tightly to receive one of the signal transmission wires (3) or the earth wire (4) with the terminals (13) receiving the earth wire effecting electrical connection between the earth wire (4) and the metal covering (9) which is in electrical connection with the conducting sheet (10); and the retainers (17) engage the insulation of the signal transmission wires (3) or the metal covering (9) of the earth wire (4).

2. An electrical harness according to claim 1, wherein the metal covering (9) is covered with a metal foil.

3. An electrical harness according to claim 1, including a plurality of earth wires (4) with the earth wires (4) arranged alternately with the signal transmission wires (3).

FIG. 1

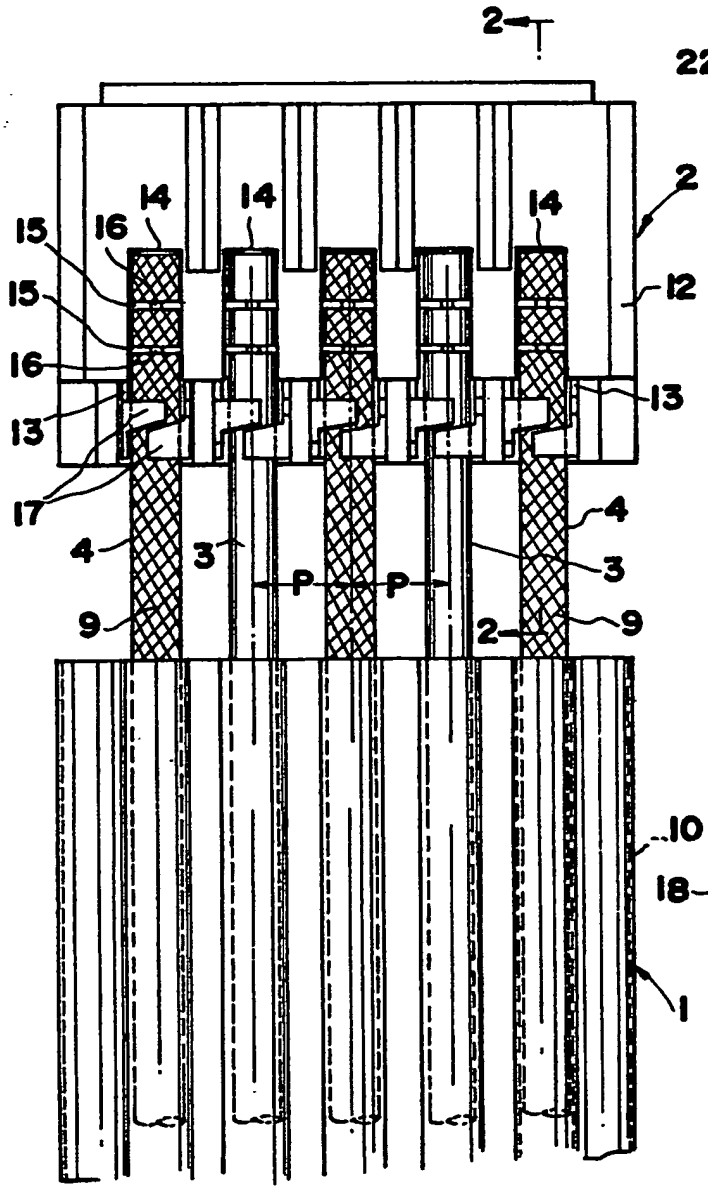


FIG.2

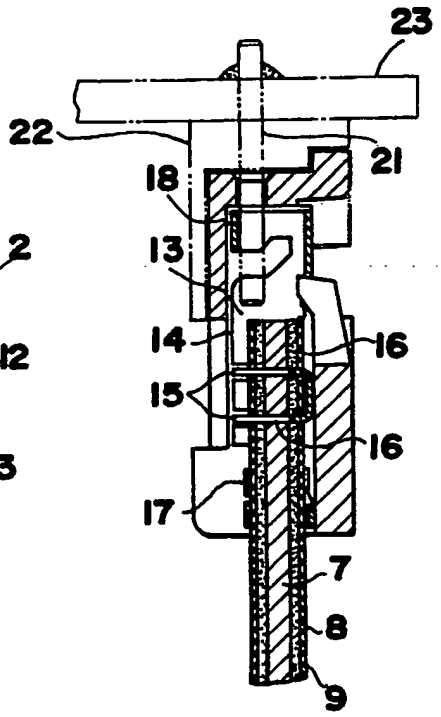


FIG.5

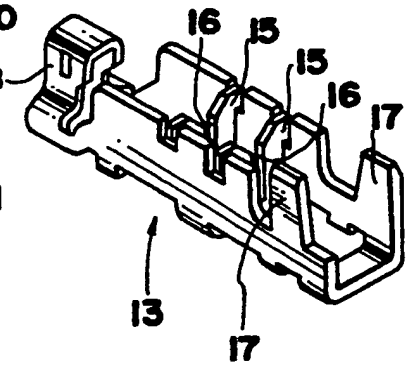


FIG.3

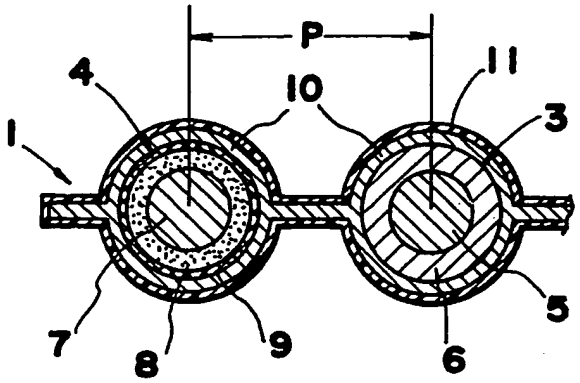
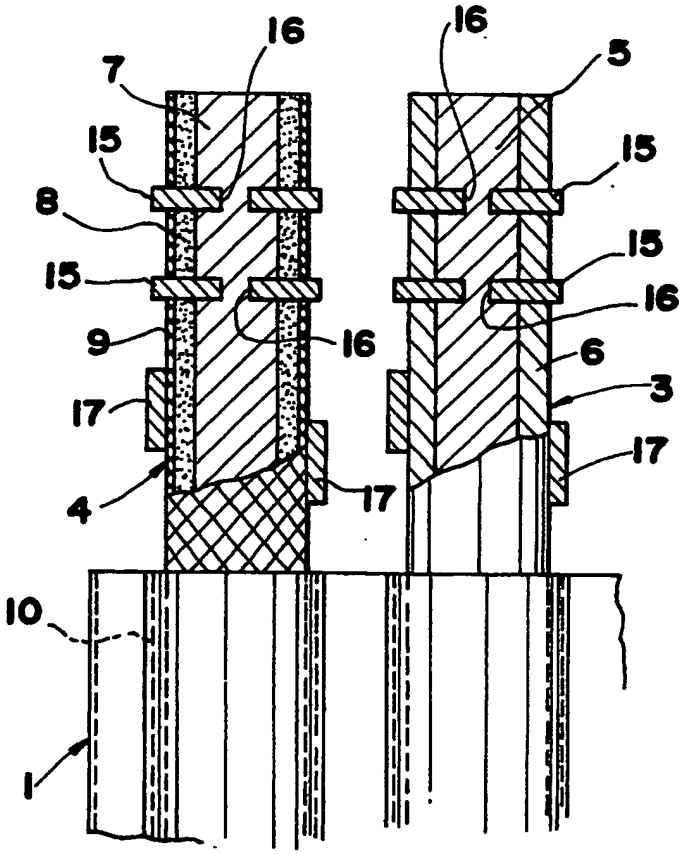


FIG.4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 2986

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	GB-A-2 047 947 (MOLEX) * Page 1, line 121 - page 2, line 72; figures 1,2 *	1	H 01 R 4/24 H 01 B 11/10
Y	US-A-4 435 035 (BERRY et al.) * Column 1, lines 21-35; column 2, lines 39-56; figures 1,3 *	1	
A	EP-A-0 059 005 (N.V. PHILIPS' GLOEILAMPENFABRIEKEN) * Abstract; page 5, lines 28-38; figure 1 *	1-3	
A	JOURNAL OF ELECTRONIC ENGINEERING, vol. 24, no. 242, February 1987, pages 50-53,79, Tokyo, JP; T. YOSHIZAKI: "Insulation displacement connectors: The new wave" * Page 51, column 1, line 15 - column 3, line 3; figure 2 *	1-3	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H 01 R
H 01 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-11-1989	KOHLER J.W.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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